WHAT IS CLAIMED IS:

1. A light-emitting semiconductor device which comprises an n-layer of n-type gallium nitride compound semiconductor ($Al_xGa_{1-x}N$; inclusive of x=0 ) and an i-layer of insulating gallium nitride compound semiconductor ($Al_xGa_{1-x}N$; inclusive of x=0 ) doped with p-type impurities, wherein at least one of said n-layer and said i-layer is of double-layer structure, the respective layers of said double-layer structure having different concentrations.

2. A light-emitting semiconductor device as claimed in Claim 1, wherein said n-layer is of double-layer structure including an n-layer of low carrier concentration and an $n^+$-layer of high carrier concentration, the former being adjacent to said i-layer.

3. A light-emitting semiconductor device as claimed in Claim 1, wherein said i-layer is of double-layer structure including an $i_L$-layer of low impurity concentration containing p-type impurities in comparatively low concentration and an $i_H$-layer of high impurity concentration containing p-type impurities in comparatively high concentration, the former being

adjacent to said n-layer.

4. A light-emitting semiconductor device as claimed in Claim 1, wherein said n-layer is of double-layer structure including an n-layer of low carrier concentration and an $n^+$-layer of high carrier concentration, the former being adjacent to said i-layer, and said i-layer is of double-layer structure including an $i_L$-layer of low impurity concentration containing p-type impurities in comparatively low concentration and an $i_H$-layer of high impurity concentration containing p-type impurities in comparatively high concentration, the former being adjacent to said n-layer.

5. A light-emitting semiconductor device as claimed in Claim 1, wherein the thickness of said n-layer is 2.5 - 12 $\mu$m.

6. A light-emitting semiconductor device as claimed in Claim 1, wherein the carrier concentration of said n-layer is $1 \times 10^{14} - 1 \times 10^{19}$ /cm$^3$.

7. A light-emitting semiconductor device as claimed in Claim 2, wherein the thickness of said n-

layer of low carrier concentration is 0.5 - 2 $\mu$m and the thickness of said $n^+$-layer of high carrier concentration is 2 - 10 $\mu$m.

8. A light-emitting semiconductor device as claimed in Claim 2, wherein the carrier concentration of said n-layer of low carrier concentration is $1 \times 10^{14} - 1 \times 10^{17}$ /cm$^3$ and the carrier concentration of said $n^+$-layer of high carrier concentration is $1 \times 10^{17} - 1 \times 10^{19}$ /cm$^3$.

9. A light-emitting semiconductor device as claimed in Claim 1, wherein the thickness of said i-layer is 0.03 - 1.3 $\mu$m.

10. A light-emitting semiconductor device as claimed in Claim 1, wherein the impurity concentration of said i-layer is $1 \times 10^{16}$ - $5 \times 10^{20}$ /cm$^3$.

11. A light-emitting semiconductor device as claimed in Claim 3, wherein the thickness of said $i_L$-layer of low impurity concentration is 0.01 - 1 $\mu$m and the thickness of said $i_H$-layer of high impurity concentration is 0.02 - 0.3 $\mu$m.

12. A light-emitting semiconductor device as claimed in Claim 3, wherein the impurity concentration of said $i_L$-layer of low impurity concentration is $1 \times 10^{16}$ - $5 \times 10^{19}$ /cm$^3$ and the impurity concentration of said $i_H$-layer of high impurity concentration is $1 \times 10^{19}$ - $5 \times 10^{20}$ /cm$^3$.

13. A light-emitting semiconductor device as claimed in Claim 2, wherein said $n^+$-layer of high carrier concentration is doped with silicon.

14. A light-emitting semiconductor device as claimed in Claim 4, wherein said $n^+$-layer of high carrier concentration is doped with silicon.

15. A light-emitting semiconductor device as claimed in Claim 3, wherein both said $i_L$-layer of low impurity concentration and said $i_H$-layer of high impurity concentration are doped with zinc, the amount of doped zinc in said $i_H$-layer of high impurity concentration being higher than that in said $i_L$-layer of low impurity concentration.

16. A light-emitting semiconductor device as claimed in Claim 4, wherein both said $i_L$-layer of low impurity concentration and said $i_H$-layer of high

impurity concentration are doped with zinc, the amount of doped zinc in said $i_H$-layer of high impurity concentration being higher than that in said $i_L$-layer of low impurity concentration.

17. A method for producing a light-emitting semiconductor device comprising an n-layer of n-type gallium nitride compound semiconductor ($Al_xGa_{1-x}N$; inclusive of x=0 ) and an i-layer of insulating gallium nitride compound semiconductor ($Al_xGa_{1-x}N$; inclusive of x=0 ) doped with p-type impurities from organometal compound by vapor phase epitaxy, comprising the steps of:

feeding a silicon-containing gas and other raw material gases together at a controlled mixing ratio to a substrate; and

growing said n-layer having a controlled conductivity.

18. A method as claimed in Claim 17, comprising:

growing an $n^+$-layer of high carrier concentration, which is an n-type gallium nitride compound semiconductor ($Al_xGa_{1-x}N$; inclusive of x=0 ) having a comparatively high conductivity, on said substrate

having a buffer layer of aluminum nitride formed thereon, by feeding said silicon-containing gas and said other raw material gases together at a controlled mixing ratio; and

growing an n-layer of low carrier concentration, which is an n-type gallium nitride compound semiconductor ($Al_xGa_{1-x}N$; inclusive of $x=0$ ) having a comparatively low conductivity, on said $n^+$-layer, by feeding said raw material gases excluding said silicon-containing gas.

19. A method for producing a gallium nitride group compound semiconductor by using an organometallic compound vapor phase epitaxy, comprising the steps of:

setting a mixing ratio of a silicon-containing gas and other raw material gases during said vapor phase epitaxy at a desired value in a range which increases substantially in proportion to a conductivity (1/resistivity) of said gallium nitride group compound semiconductor so as to control conductivity (1/resistivity) of said gallium nitride group compound semiconductor at a desired value; and

forming said gallium nitride group compound semiconductor by feeding said silicon-containing gas and other raw material gases at a mixing ratio set above.

20. A method for producing a gallium nitride group compound semiconductor by using an organometallic compound vapor phase epitaxy, comprising the steps of:

setting a mixing ratio of a silicon-containing gas and other raw material gases during said vapor phase epitaxy at a desired value in a range which increases substantially in proportion to an electron concentration of said gallium nitride group compound semiconductor so as to control a carrier concentration of said gallium nitride group compound semiconductor at a desired value; and

forming said gallium nitride group compound semiconductor by feeding said silicon-containing gas and other raw material gases at a mixing ratio set above.

21. A method for producing a gallium nitride group compound semiconductor according to claim 19, wherein said gallium nitride group compound semiconductor is $Al_xGa_{1-x}N$ $(0 \leq x \leq 1)$.

22. A method for producing a gallium nitride group compound semiconductor according to claim 20, wherein said gallium nitride group compound semiconductor is $Al_xGa_{1-x}N$ ($0 \leq x \leq 1$).

23. A method for producing a gallium nitride group compound semiconductor according to claim 19, wherein said gallium nitride group compound semiconductor is GaN.

24. A method for producing a gallium nitride group compound semiconductor according to claim 20, wherein said gallium nitride group compound semiconductor is GaN.

25. A method for producing a gallium nitride group compound semiconductor according to claim 19, wherein said conductivity (1/resistivity) is not less than 3.3/Ωcm.

26. A method for producing a gallium nitride group compound semiconductor according to claim 21, wherein said conductivity (1/resistivity) is not less than 3.3/Ωcm.

27. A method for producing a gallium nitride group compound semiconductor according to claim 23, wherein said conductivity (1/resistivity) is not less than 3.3/Ωcm.

28. A method for producing a gallium nitride group compound semiconductor according to claim 20, wherein said electron concentration is not less than $6 \times 10^{16}/cm^3$.

29. A method for producing a gallium nitride group compound semiconductor according to claim 22, wherein said electron concentration is not less than 6 x $10^{16}/cm^3$.

30. A method for producing a gallium nitride group compound semiconductor according to claim 24, wherein said electron concentration is not less than 6 x $10^{16}/cm^3$.

31. A method for producing a gallium nitride group compound semiconductor according to claim 19, wherein said conductivity (1/resistivity) is ranging from 3.3/Ωcm to 1.3 x lO$^{2}$/Ωcm.

32. A method for producing a gallium nitride group compound semiconductor according to claim 21, wherein said conductivity (1/resistivity) is ranging from 3.3/Ωcm to 1.3 x lO$^{2}$/Ωcm.

33. A method for producing a gallium nitride group compound semiconductor according to claim 23, wherein said conductivity (1/resistivity) is ranging from 3.3/Ωcm to 1.3 x $10^{2}$/Ωcm.

34. A method for producing a gallium nitride group compound semiconductor according to claim 20, wherein said electron concentration is ranging from 6 x $10^{16}/cm^3$ to 3 x $10^{18}/cm^3$.

35. A method for producing a gallium nitride group compound semiconductor according to claim 22, wherein said electron concentration is ranging from $6 \times 10^{16}/cm^3$ to $3 \times 10^{18}/cm^3$.

36. A method for producing a gallium nitride group compound semiconductor according to claim 24, wherein said electron concentration is ranging from $6 \times 10^{16}/cm^3$ to $3 \times 10^{18}/cm^3$.

37. A method for producing a gallium nitride group compound semiconductor according to claim 19, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

38. A method for producing a gallium nitride group compound semiconductor according to claim 20, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

39. A method for producing a gallium nitride group compound semiconductor according to claim 21, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

40. A method for producing a gallium nitride group compound semiconductor according to claim 22, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

41. A method for producing a gallium nitride group compound semiconductor according to claim 25, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

42. A method for producing a gallium nitride group compound semiconductor according to claim 28, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

43. A method for producing a gallium nitride group compound semiconductor according to claim 31, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

44. A method for producing a gallium nitride group compound semiconductor according to claim 34, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

45. A method for producing a gallium nitride group compound semiconductor according to claim 37, wherein said buffer layer is formed on said sapphire substrate by using an organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

46. A method for producing a gallium nitride group compound semiconductor according to claim 38, wherein said buffer layer is formed on said sapphire substrate by using an organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

47. A method for producing a gallium nitride group compound semiconductor according to claim 39, wherein said buffer layer is formed on said sapphire substrate by using an organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

48. A method for producing a gallium nitride group compound semiconductor according to claim 40, wherein said buffer layer is formed on said sapphire substrate by using an organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

49. A method for producing a gallium nitride group compound semiconductor according to claim 41, wherein said buffer layer is formed on said sapphire substrate by using an organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

50. A method for producing a gallium nitride group compound semiconductor according to claim 42, wherein said buffer layer is formed on said sapphire substrate by using an organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

51. A method for producing a gallium nitride group compound semiconductor according to claim 43, wherein said buffer layer is formed on said sapphire substrate by using an organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

52. A method for producing a gallium nitride group compound semiconductor according to claim 44, wherein said buffer layer is formed on said sapphire substrate by using an organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

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53. A method for producing a gallium nitride group compound semiconductor by an organometallic compound vapor phase epitaxy, comprising the steps of:

setting a supplying rate of silicon (Si) to gallium (Ga) in a reaction chamber during said vapor phase epitaxy at a desired value in a range from 0.1 to 3 as a converted values so as to control a conductivity (1/resistivity) of said gallium nitride group compound semiconductor at a desired value, where said values 0.1 and 3 are the values obtained from gas flow rates, in case that an amount of said gallium (Ga) is converted into a flow rate of hydrogen bubbling trimethyl

gallium (TMG) at a temperature of -15°C and an amount of said silicon (Si) is converted into a flow rate of a gas diluted to 0.86 ppm.

54. A method for producing a gallium nitride group compound semiconductor by an organometallic compound vapor phase epitaxy, comprising the steps of:

setting a supplying rate of silicon (Si) to $NH_3$ in a reaction chamber during said vapor phase epitaxy at a desired value in a range from $8.6 \times 10^{-10}$ to $2.6 \times 10^{-8}$, so as to control a conductivity (1/resistivity) of said gallium nitride group compound semiconductor at a desired value.

55. A method for producing a gallium nitride group compound semiconductor by an organometallic compound vapor phase epitaxy, comprising the steps of:

setting a supplying rate of silicon (Si) to gallium (Ga) in a reaction chamber during said vapor phase epitaxy at a desired value in a range from 0.1 to 3 as a converted values so as to control a carrier concentration of said gallium nitride group compound semiconductor at a desired value, where said values 0.1 and 3 are the values obtained from gas flow rates, in case that an amount of said gallium (Ga) is converted into a flow rate of hydrogen bubbling trimethyl gallium (TMG) at a temperature of -15°C and an amount of said silicon (Si) is converted into a flow rate of a gas diluted to 0.86 ppm.

56. A method for producing a gallium nitride group compound semiconductor by an organometallic compound vapor phase epitaxy, comprising the steps of:

setting a supplying rate of silicon (Si) to $NH_3$ in a reaction chamber during said vapor phase epitaxy at a desired value in a range from $8.6 \times 10^{-10}$ to $2.6 \times 10^{-8}$, so as to control a carrier concentration of said gallium nitride group compound semiconductor at a desired value.

57. A method for producing a gallium nitride group compound semiconductor according to claim 53, wherein said gallium nitride group compound semiconductor is $Al_xGa_{1-x}N$ ($0 \leq x \leq 1$).

58. A method for producing a gallium nitride group compound semiconductor according to claim 54, wherein said gallium nitride group compound semiconductor is $Al_xGa_{1-x}N$ ($0 \leq x \leq 1$).

59. A method for producing a gallium nitride group compound semiconductor according to claim 55, wherein said gallium nitride group compound semiconductor is $Al_xGa_{1-x}N$ ($0 \leq x \leq 1$).

60. A method for producing a gallium nitride group compound semiconductor according to claim 56, wherein said gallium nitride group compound semiconductor is $Al_xGa_{1-x}N$ ($0 \leq x \leq 1$).

61. A method for producing a gallium nitride group compound semiconductor according to claim 53, wherein said gallium nitride group compound semiconductor is GaN.

62. A method for producing a gallium nitride group compound semiconductor according to claim 54, wherein said gallium nitride group compound semiconductor is GaN.

63. A method for producing a gallium nitride group compound semiconductor according to claim 55, wherein said gallium nitride group compound semiconductor is GaN.

64. A method for producing a gallium nitride group compound semiconductor according to claim 56, wherein said gallium nitride group compound semiconductor is GaN.

65. A method for producing a gallium nitride group compound semiconductor according to claim 53, wherein said conductivity (1/resistivity) is not less than 3.3/Ωcm.

66. A method for producing a gallium nitride group compound semiconductor according to claim 54, wherein said conductivity (1/resistivity) is not less than 3.3/Ωcm.

67. A method for producing a gallium nitride group compound semiconductor according to claim 57, wherein said conductivity (1/resistivity) is not less than 3.3/Ωcm.

68. A method for producing a gallium nitride group compound semiconductor according to claim 58, wherein said conductivity (1/resistivity) is not less than 3.3/Ωcm.

69. A method for producing a gallium nitride group compound semiconductor according to claim 61, wherein said conductivity (1/resistivity) is not less than 3.3/Ωcm.

70. A method for producing a gallium nitride group compound semiconductor according to claim 62, wherein said conductivity (1/resistivity) is not less than 3.3/Ωcm.

71. A method for producing a gallium nitride group compound semiconductor according to claim 55, wherein said electron concentration is not less than 6 x $10^{16}$/$cm^3$.

72. A method for producing a gallium nitride group compound semiconductor according to claim 56, wherein said electron concentration is not less than 6 x $10^{16}$/$cm^3$.

73. A method for producing a gallium nitride group compound semiconductor according to claim 59, wherein said electron concentration is not less than 6 x $10^{16}$/$cm^3$.

74. A method for producing a gallium nitride group compound semiconductor according to claim 60, wherein said electron concentration is not less than 6 x $10^{16}$/$cm^3$.

75. A method for producing a gallium nitride group compound semiconductor according to claim 53, wherein said conductivity (1/resistivity) is ranging from 3.3/Ωcm to 1.3 x $10^2$/Ωcm.

76. A method for producing a gallium nitride group compound semiconductor according to claim 54, wherein said conductivity (1/resistivity) is ranging from 3.3/Ωcm to 1.3 x $10^2$/Ωcm.

77. A method for producing a gallium nitride group compound semiconductor according to claim 57, wherein said conductivity (1/resistivity) is ranging from 3.3/Ωcm to $1.3 \times 10^2$/Ωcm.

78. A method for producing a gallium nitride group compound semiconductor according to claim 58, wherein said conductivity (1/resistivity) is ranging from 3.3/Ωcm to $1.3 \times 10^2$/Ωcm.

79. A method for producing a gallium nitride group compound semiconductor according to claim 61, wherein said conductivity (1/resistivity) is ranging from 3.3/Ωcm to $1.3 \times 10^2$/Ωcm.

80. A method for producing a gallium nitride group compound semiconductor according to claim 62, wherein said conductivity (1/resistivity) is ranging from 3.3/Ωcm to $1.3 \times 10^2$/Ωcm.

81. A method for producing a gallium nitride group compound semiconductor according to claim 55, wherein said electron concentration is ranging from $6 \times 10^{16}$/cm$^3$ to $3 \times 10^{18}$/cm$^3$.

82. A method for producing a gallium nitride group compound semiconductor according to claim 56, wherein said electron concentration is ranging from $6 \times 10^{16}$/cm$^3$ to $3 \times 10^{18}$/cm$^3$.

83. A method for producing a gallium nitride group compound semiconductor according to claim 59, wherein said electron concentration is ranging from $6 \times 10^{16}/cm^3$ to $3 \times 10^{18}/cm^3$.

84. A method for producing a gallium nitride group compound semiconductor according to claim 60, wherein said electron concentration is ranging from $6 \times 10^{16}/cm^3$ to $3 \times 10^{18}/cm^3$.

85. A method for producing a gallium nitride group compound semiconductor according to claim 63, wherein said electron concentration is ranging from $6 \times 10^{16}/cm^3$ to $3 \times 10^{18}/cm^3$.

86. A method for producing a gallium nitride group compound semiconductor according to claim 64, wherein said electron concentration is ranging from $6 \times 10^{16}/cm^3$ to $3 \times 10^{18}/cm^3$.

87. A method for producing a gallium nitride group compound semiconductor according to claim 53, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

88. A method for producing a gallium nitride group compound semiconductor according to claim 54, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

89. A method for producing a gallium nitride group compound semiconductor according to claim 55, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

90. A method for producing a gallium nitride group compound semiconductor according to claim 56, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

91. A method for producing a gallium nitride group compound semiconductor according to claim 57, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

92. A method for producing a gallium nitride group compound semiconductor according to claim 58, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

93. A method for producing a gallium nitride group compound semiconductor according to claim 59, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

94. A method for producing a gallium nitride group compound semiconductor according to claim 60, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

95. A method for producing a gallium nitride group compound semiconductor according to claim 61, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

96. A method for producing a gallium nitride group compound semiconductor according to claim 62, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

97. A method for producing a gallium nitride group compound semiconductor according to claim 63, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

98. A method for producing a gallium nitride group compound semiconductor according to claim 64, wherein said gallium nitride group compound semiconductor is formed on or above a buffer layer which is formed on a sapphire substrate.

99. A method for producing a gallium nitride group compound semiconductor according to claim 87, wherein said buffer layer is formed on said sapphire substrate by using an

organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

100. A method for producing a gallium nitride group compound semiconductor according to claim 88, wherein said buffer layer is formed on said sapphire substrate by using an organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

101. A method for producing a gallium nitride group compound semiconductor according to claim 89, wherein said buffer layer is formed on said sapphire substrate by using an organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

102. A method for producing a gallium nitride group compound semiconductor according to claim 90, wherein said buffer layer is formed on said sapphire substrate by using an organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

103. A method for producing a gallium nitride group compound semiconductor according to claim 91, wherein said buffer layer is formed on said sapphire substrate by using an organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

104. A method for producing a gallium nitride group compound semiconductor according to claim 92, wherein said buffer layer is formed on said sapphire substrate by using an organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

105. A method for producing a gallium nitride group compound semiconductor according to claim 93, wherein said buffer layer is formed on said sapphire substrate by using an organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

106. A method for producing a gallium nitride group compound semiconductor according to claim 94, wherein said buffer layer is formed on said sapphire substrate by using an organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

107. A method for producing a gallium nitride group compound semiconductor according to claim 95, wherein said buffer layer is formed on said sapphire substrate by using an organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

108. A method for producing a gallium nitride group compound semiconductor according to claim 96, wherein said buffer layer is formed on said sapphire substrate by using an

organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

109. A method for producing a gallium nitride group compound semiconductor according to claim 97, wherein said buffer layer is formed on said sapphire substrate by using an organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

110. A method for producing a gallium nitride group compound semiconductor according to claim 98, wherein said buffer layer is formed on said sapphire substrate by using an organometallic compound vapor phase epitaxy at a growth temperature lower than that of said gallium nitride group compound semiconductor.

111. A method for producing a gallium nitride group compound semiconductor according to claim 19, wherein silicon-containing gas is silane ($SiH_4$).

112. A method for producing a gallium nitride group compound semiconductor according to claim 20, wherein silicon-containing gas is silane ($SiH_4$).

113. A method for producing a gallium nitride group compound semiconductor according to claim 53, wherein silicon-containing gas is silane ($SiH_4$).

114. A method for producing a gallium nitride group compound semiconductor according to claim 54, wherein silicon-containing gas is silane ($SiH_4$).

115. A method for producing a gallium nitride group compound semiconductor according to claim 55, wherein silicon-containing gas is silane ($SiH_4$).

116. A method for producing a gallium nitride group compound semiconductor according to claim 56, wherein silicon-containing gas is silane ($SiH_4$).

117. A method for producing a gallium nitride group compound semiconductor according to claim 63, wherein said electron concentration is not less than $6 \times 10^{16}/cm^3$.

118. A method for producing a gallium nitride group compound semiconductor according to claim 64, wherein said electron concentration is not less than $6 \times 10^{16}/cm^3$.--